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EXAMINER	
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ART UNIT	PAPER NUMBER
2889	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/552,936	BRAUNE ET AL.	
	Examiner	Art Unit	
	FATIMA N. FAROKHROOZ	2889	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The Amendment, filed on 02/25/08 has been entered and acknowledged by the Examiner. Claims 17-21 have been added.

Cancellation of claim 16 has been entered.

Claims 1-15 and 17-21 are pending in the instant application.

Election/ Restriction

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-13, 16-21, drawn to a product of a luminescence-conversion LED, classified in class 313, subclass 486 .

   II. Claims 14-15, drawn to a method of making the product, classified in, class 427,subclass 66.

Inventions I and II are related as product and process of making it. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process. For example, the product as claimed can be made as follows: The nanophosphor is applied to the chip by vapor deposition.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required

because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

Newly submitted claims 14-15 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claims 14-15 are drawn to a method of making the product.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 14-15 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Taskar et al (US 6734465).

Regarding claim 1, Taskar teaches a luminescence-conversion LED (Fig.1;col.6,lines 62-65; col.1,lines 13-16), comprising: an LED chip (col.1;lines 12-16 and 37-41) emitting primary radiation with a peak wavelength in the range of 300 to 470

nm (col.1,line 37-39; col.5,lines 32-44; claims 4 and 24 ; also see col.4,lines 55-65 wherein absorption is in the 370-470 nm range and col.5,lines 20-55; wherein **down conversion** is disclosed which is the secondary **longer-wave radiation**), the primary radiation being converted partly or completely into secondary longer- wave radiation (see col.1,line 37-39 wherein the blue LED energizes the yellow phosphor which is of longer wavelength;col.2,lines 8-14) by photoluminescence by at least one phosphor (blue phosphor in (col.1;lines 37-41) which is exposed to the primary radiation of the LED, wherein the at least one phosphor is a nanophosphor having a mean particle size d50 that lies in the range of 1 to 50 nm (lines 43-45 of col.3; lines 23-25 of col.7 and claim 3 of Taskar).

Regarding claim 2, Taskar teaches a luminescence-conversion LED, wherein the at least one phosphor is dispersed in an encapsulating compound which is exposed to the primary radiation, the encapsulating compound comprising insulating material (lines 65-68 of col.6 to lines 1-6 of col.7 wherein suitable insulating matrix materials are listed).

Regarding claim 3, Taskar teaches a luminescence-conversion LED, wherein a blue emitting primary radiation of a peak wavelength of 420 to 470 nm is used (Col.1,lines 35-40;col.2;lines 8-15;col.4,lines 55-65;also see rejection in claim 1), together with a secondary yellow emitting phosphor (col.5,lines 37-42;col.1;lines 49-51;col.2,lines 57-59;col.3,lines 31-33).

Regarding claim 4, Taskar teaches a luminescence-conversion LED, wherein a UV (col.3,lines 30-35;col.5,lines 45-48) emitting primary radiation of a peak wavelength of 330 to 410 nm is used (see rejections in claims 1 and 3), together with three secondary red, green and blue emitting phosphors (col.1;lines 57-60;col.3;lines 30-34;claim 21).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7-9, and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taskar et al (US 6734465) as applied to claim 1 above.

Regarding claim 7, Taskar teaches an luminescence -conversion LED (Fig.1), comprising: an LED chip emitting primary radiation with a peak wavelength in the range of 330 nm to 470 nm, the primary radiation being converted partly or completely into secondary longer-wave radiation by photoluminescence by at least one phosphor which is exposed to the primary radiation, the at least one phosphor being a nanophosphor having a mean particle size d50 that lies in the range of 1 to 50 nm (see rejection in

claim 1 above). Further Taskar teaches that the nanophosphor is made to luminesce by an activator (col.4,lines 20-28;col.10,lines 50-62)

Taskar does not explicitly teach that the nanophosphor has an absorption in the range of the peak wavelength of the primary radiation of less than 50%, and wherein the nanophosphor has a reflection of greater than 50%.

However, Taskar teaches that the absorption depends on the activator (col.5, lines 48-50; col.5,lines 32-36) and on the impurity in the nanostructure (col.4,lines 45-48). Further, depending on the variation of the absorption, the reflection also gets varied.

Therefore, regarding the absorption and the reflection ranges: since Taskar discloses that the absorption depends on known factors as described above, but does not disclose a particular range for these parameters; it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide an absorption greater than 50% and a reflection of less than 50%, since where the general conditions of a claim are disclosed in the prior art, discovering the “optimum range” involves only routine skill in the art.

Regarding claims 8,19 , 20 and 21, Taskar teaches an luminescence - conversion LED (Fig.1), comprising: an LED chip emitting primary radiation with a peak wavelength in the range of 300 nm to 470 nm, the primary radiation being converted partly or completely into secondary longer-wave radiation by photoluminescence by at least one phosphor which is exposed to the primary radiation, the at least one phosphor

being a nanophosphor having a mean particle size d50 that lies in the range of 1 to 50 nm (see rejection in claim 1 above).

Taskar does not explicitly teach that a long-wave absorption edge of the nanophosphor is the wavelength related to a point (A50) where the absorption of the phosphor has fallen to only 50% of the maximum absorption, and is located at a shorter wavelength than a long wavelength edge of the primary emission of the LED chip, the long wavelength edge being defined as the wavelength lambda90 (for claim 8), lambda70 (for claim 19) lambda50 (for claim 20) and as the peak wavelength (*p) (claim 21) which belongs to the threshold where the emission intensity of the primary radiation reaches 10% (for claim 8) ;30% (for claim 19); 50% (for claim 20) of the peak emission intensity of the primary emission of the LED chip; and which belongs to the peak of the emission intensity of the primary radiation of the LED chip (for claim 21).

However, Taskar teaches that the absorption depends on the activator (col.5, lines 32-37 and lines 48-50) and on the impurity in the nanostructure (col.4, lines 43-48). Taskar also discloses the absorption and the emission properties of nanophosphors (col.4, lines 55-65; col.9,lines 47-60;col.10;lines 3-8).

Therefore, regarding the absorption and the emission intensity: since Taskar discloses that the absorption and the emission in nanophosphors depends on known factors as described above and also discloses the absorption efficiencies , but does not disclose a particular range for these parameters; it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide an absorption and the amount of emission in percentage values, since where the general

conditions of a claim are disclosed in the prior art, discovering the “optimum range” involves only routine skill in the art and can be achieved by routine experimentation.

Regarding claim 9, Taskar teaches an luminescence -conversion LED (Fig.1) wherein the nanophosphor includes an activator.

Taskar does not teach an LED, wherein the concentration of the activator is at most 75%, of the concentration of the activator included in an identical micrometer-phosphor so that the given activator concentration of the micro-meter-phosphor-is higher and serves as a reference corresponding to 100%, the micrometer-phosphor being chosen such that it has a high absorption of more than 50% in the range of the peak wavelength of the primary radiation but an identical phosphor with low concentration of the activator has low absorption of at most 30% in the range of the peak wavelength of the primary radiation.

However, Taskar further teaches that the absorption depends on the activator (col.5, lines 48-50 and 32-36) and on the impurity in the nanostructure (col.4,lines 15-25; lines 45-55). Tasker further discloses that the **absorption efficiency of 80-90%** can be achieved by the nanoparticles.

Hence , with respect to the specific concentrations of the activator and the absorption regions: the applied Prior Art Taskar has disclosed the LED dependencies on the light generated and on the activator. The specific activator concentrations and the absorption claimed by applicant, absent any criticality, is only considered to be the "optimum" values based on the theory disclosed by the Prior Art that a person having

ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, and since neither non- obvious nor unexpected results, i.e., results which are different in kind and not in degree from the results of the prior art, will be obtained as long as various activator concentration values are experimented as suggested by the Prior Art. In this case, varying the activator concentration will be obvious for one having ordinary skill in the art who want to modify the absorption depending on the peak wavelength of the primary radiation.

Regarding Claims 17 and 18, Taskar teaches the invention set forth above (see rejection in Claim 1 above). Further Taskar teaches that phosphor is used comprising semiconducting nanoparticles (col.4, lines 20-25; col.10; lines 20-25 and 43-49) .

Further, Taskar teaches the achievement of a **line emitter** (col.2, lines 29-32; col.4, **lines 28-35** and 55-59) that implies achieving narrow FWHM values by the invention of the nanophosphors.

However, Taskar does not explicitly teach an LED, with a primary radiation source whose FWHM is less than 20 nm (claim 17) and less than 10 nm (claim 18).

Therefore, regarding the FWHM value of the primary radiation source : Taskar discloses a line emitter from the nanophosphor LED ;but does not specifically state a particular value. However, to achieve a particular range of the FWHM ;absent any criticality, is only considered to be the “ optimum ” range for the line-emitter, as stated above, that a person having ordinary skill in the art would have been able to determine

using routine experimentation based, among other things, on the desired accuracy and since ;discovering an optimum value of a result effective variable involves only routine skill in the art.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taskar et al (US 6734465) as applied to claims 1 and 4 above, further in view of Fink (US PG pub. 20030057821).

Regarding claim 5, Taskar teaches the invention set forth above (see rejections in claims 1 and 4). Taskar does not disclose an LED, further comprising a phosphor system comprising: Y202S:Eu for red; ZnS: Cu,Al or ZnS:Cu,Mn or ZnS:Cu for green; and SCAP or ZnS:Ag for blue.

In the same field of endeavor of display devices, the added Fink reference teaches a light emitting device wherein the following phosphor system is used: Y202S:Eu for red; ZnS: Cu,Al for green; and ZnS: Ag for blue ([0005], lines 1-5) in order to make them vacuum compatible for many applications ([0004]).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to use the phosphor system as disclosed by Fink, in the LED of the Taskar in order to make them vacuum compatible for many applications

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Taskar et al (US 6734465) as applied to claim 1 ;further in view of Burroughes (US PG pub. 20030076454).

Regarding claim 11, Taskar teaches an LED (see rejection of claim 1). Taskar does not teach that the chip is connected to a voltage source via electrically conductive terminals.

In the same field of endeavor, Burroughes implicitly teaches a light emitting device (Fig.1) wherein the chip is connected to a voltage source ([0030],[0033]; Table 1 ,Table 2) via electrically conductive terminals for the benefit of operating the device at low voltage, so that lower power is consumed.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to use a voltage source as disclosed by Burroughes, in the LED of Taskar for the benefit of operating the device at lower voltage, so that lower power is consumed.

Regarding claim 12, Burroughes teaches a light emitting device connected to a voltage source wherein the voltage source provides a voltage of at most 5 V ([0030],[0033]).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taskar et al (US 6734465) as applied to claim 1 in view of Bhargava et al (US 6241819).

Regarding claim 10, Taskar teaches the invention set forth above

(see rejections in claim 1). Taskar further teaches that the LED comprises of semiconducting nanoparticles. However Taskar does not teach the LED that includes CdSe.

In the same field of endeavor, Bhargava teaches a single phosphor including semiconducting nanoparticles, in particular CdSe (col.4,lines 40-44) in order to achieve greater photoluminescent quantum yield.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to use the CdSe as disclosed by Bhargava, in the LED of Taskar in order to achieve greater photoluminescent quantum yield.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taskar et al (US 6734465) as applied to claim 1 ; in view of Haubold et al (US 20030032192).

Regarding claim 6, Taskar teaches an luminescence-conversion LED, comprising: an LED chip emitting primary radiation with a peak wavelength in the range of 380 nm to 410 nm, the primary radiation being converted partly or completely into secondary longer-wave radiation by photoluminescence by at least one phosphor, wherein the at least one phosphor is a nanophosphor having a mean particle size d50 that lies in the range of 1 to 50 nm and which is exposed to the primary radiation (see rejection in claim 1 above).

Further Taskar teaches that the nanophosphor is made to luminesce by an activator (col.4,lines 20-28;col.10,lines 50-62).

Taskar does not explicitly teach an LED wherein the at least one phosphor is an absorption in the range of the peak wavelength of the primary radiation of less than 50%, and wherein the at least one phosphor comprises at least one of sulfates, borates, and spatites.

However, Taskar teaches that the absorption depends on the activator (col.5, lines 48-50; col.5, lines 32-36) and on the impurity in the nanostructure (col.4,lines 45-48). Further, depending on the variation of the absorption, the reflection is also varied.

Therefore, regarding the absorption range: since Taskar discloses that the absorption depends on known factors as described above, but does not disclose a particular range for these parameters; it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide an absorption less than 50%; since where the general conditions of a claim are disclosed in the prior art, discovering the “optimum range” involves only routine skill in the art.

Further, Taskar does not teach that the at least one phosphor comprises at least one of sulfates, borates, and spatites.

In the same field of endeavor, Haubold teaches that the at least one phosphor comprises of borates or sulphates ([0005],[0021],[0035];claim 1,44 and 50) in order to prepare lighting devices with a simple and economical method ([0130]).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to add the phosphor, as disclosed by Haubold, in the LED of Taskar in order to prepare lighting devices with a simple and economical method ([0130]).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taskar et al (US 6734465) as applied to claims 1 and 9 above; further in view of Doxsee (US 20040159846).

Regarding claim 13, Taskar teaches the invention set forth above (see rejection in claim 9 above). Taskar further teaches that the nanophosphor is a garnet which is doped with a rare earth element D (col.1,lines 37-39;claim 13 of Taskar; col.10;lines 50-62) and also that the absorption depends on the activator (col.5, lines 48-50; col.5,lines 32-36) and on the impurity in the nanostructure (col.4,lines 45-48).

However, Taskar does not teach that the garnet is garnet A3B5012.

In the same field of endeavor, Doxsee teaches that the phosphor is a garnet A3B5012 wherein the specific composition for A3B5012 garnet is disclosed ([0034]) in order to produce white light of a desired white shade that is used as lighting in the automative industry ([0027] and [0032]).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to add the phosphor, as disclosed by Doxsee, in the LED of Taskar in order to produce white light of a desired white shade that is used as lighting in the automative industry ([0027] and [0032]).

Further, the previous combination does not teach that the proportion of the dopant (activators) D being at most 0.9 mol % of a component A of the garnet A3B5012.

Regarding the mole % of the dopant, since discloses the dopant and the dependence of the absorption on the dopant , to choose a 0.9 mol.% for the dopant,

absent any criticality, is only considered to be the “ optimum ” value, that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy and discovering an optimum value of a result effective variable involves only routine skill in the art.

Response to Arguments

Applicant's arguments with respect to claim 1 and its dependant claims have been considered but are moot in view of the new ground(s) of rejection.

Other Prior Art Cited

The prior art made of record and not relied upon is considered pertinent to applicant’s disclosure:

US 6241819 teaches the absorption vs wavelength and the intensity vs wavelength dependances for quantum size phosphors.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fatima Farokhrooz whose telephone number is (571)-272-6043. The examiner can normally be reached on Monday- Friday, 9 am - 5 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Minh-Toan Ton can be reached on (571) 272-2303. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published

applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Fatima N Farokhrooz/
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